

**U.S. DEPARTMENT OF COMMERCE  
National Telecommunications & Information Administration**

Evaluation of the  
Telecommunications and Information Infrastructure Assistance Program

**Case Study Report**

**NetWellness—Ohio Valley Community Health Information Network  
94081**

**Cincinnati, Ohio**

Report Revised: August 23, 1999

Site Visitors: Paul Tuss and Kathy Sharp

Dates of Visit: January 15-16, 1998

## **PREFACE**

On behalf of the National Telecommunications and Information (NTIA), I am pleased to share the following report that is one of a series of case studies conducted on grants awarded by the Telecommunications and Information Infrastructure Assistance Program (TIIAP) in 1994 and 1995. The case studies are part of the program's evaluation effort designed to gain knowledge about the effects and lessons of TIIAP-funded projects. NTIA contracted Westat, a research and consulting firm, to perform an independent evaluation of the program's first two years of grants. The evaluation consisted of a mail survey of 206 grant recipient organizations and in-depth case studies of selected projects. In February, 1999, the Commerce Department released Westat's evaluation report.

The projects selected for the case studies cover a broad range of program types and sizes, planning grants as well as demonstration grants, and they show varying degrees of implementation, sustainability, and replication. Westat selected the projects to represent a cross-section of all projects funded in the program's first two years. Specific selection criteria included geographic region, target population, project application area, project category, and size of award. To conduct each case study, Westat reviewed all project files, including progress reports and the final report, and conducted site visits. The site visits consisted of project demonstrations and interviews with project staff, representatives of partner organizations, and project end users.

NTIA thanks the case study participants for their time and their willingness to share not only their successes but their difficulties, too. Most of all, we applaud their pioneering efforts to bring the benefits of advanced telecommunications and information technologies to communities in need. We are excited about the case studies and lessons they contain. It is through the dissemination of these lessons that we extend the benefits of TIIAP-funded projects nationwide.

We hope you find this case study report valuable and encourage you to read other TIIAP case studies. You may obtain additional case studies and other TIIAP publications, including the final Westat evaluation report, through the NTIA web site ([www.ntia.doc.gov](http://www.ntia.doc.gov)) or by calling the TIIAP office at (202) 482-2048. We also are interested in your feedback. If you have comments on this case study or suggestions on how TIIAP can better provide information on the results and lessons of its grants, please contact Francine E. Jefferson, Ph.D. at (202) 482-2048 or by email at [fjefferson@ntia.doc.gov](mailto:fjefferson@ntia.doc.gov).

Larry Irving  
Assistant Secretary for Communications and Information

## **THAP CASE STUDY**

### **NetWellness—Ohio Valley Community Health Information Network**

#### **EXECUTIVE SUMMARY**

NetWellness is a web-based consumer health information service developed by the University of Cincinnati Medical Center (UCMC) with many community partners. The NetWellness database includes information from a variety of sources—textbooks, medical and professional journals, and research articles. It covers drug information, disease information, standard and alternative treatment information, and general health and wellness information. It is significant that in 1997 Ohio's two other Carnegie I research universities, Ohio State University and Case Western Reserve University, joined NetWellness.

The contents of the consumer health database are made available to the public via a World Wide Web site (<http://www.netwellness.org>) and a network of public access sites. Anyone with a connection to the World Wide Web can access NetWellness. However, some resources are commercially licensed for specific locations and may be used only from the public access sites or other authorized locations. Virtually all of the original public access sites are located in Ohio Valley, which encompasses southern Ohio from Marietta to Cincinnati, northern Kentucky, and southeastern Indiana. At the time of the site visit in January 1998, the full suite of NetWellness resources was accessible from Ohio's 700 public libraries and 46 regional public access sites. Each of the 46 public access workstations is equipped with an Intel Pentium personal computer that is networked to the NetWellness servers at UCMC. With assistance from a wide range of community partners, UCMC assumes responsible for (1) creating and identifying content for the NetWellness site, (2) evaluating the site's usefulness, (3) upgrading the system when needed, and (4) training staff at the public access sites.

By all indications, NetWellness represents a successful use of advanced telecommunications and information technologies to serve the public interest. Usage statistics show that people use a NetWellness resource nearly 400,000 times each month from all 50 states, all Canadian Provinces, and over 50 countries. Overall, NetWellness appears to provide a level of quality and quantity of content beyond what was specified in the THAP grant proposal. It features expanded topic coverage, expanded resources to address those topics, and expanded involvement from experts in participatory as well as advisory roles. In addition, the NetWellness project provides numerous benefits to the planned and existing telecommunications infrastructure in the Ohio Valley region. For example, NetWellness has proven to be compatible with other technology initiatives in the state, such as efforts to wire all public libraries and all public schools to the Internet.

Members of the NetWellness team reported several factors that contributed to the success of their project. For example, NetWellness organizers have worked hard to develop broad community involvement and solid political underpinnings for the project. Another key to NetWellness' success has been strict adherence to basic standards for the project's content and technical implementation wherever possible. For example, the NetWellness team relies on industry standards and market leaders for all hardware and software purchases rather than taking chances with unproven technologies. Another important factor in the success of the NetWellness project was finding an underwriter (the University of Cincinnati) to secure the matching commitment for the proposal, thus making the consequent acquisition of local matching funds for the grant a less stressful process.

Perhaps the most important key to the success of the project concerns the project team's commitment to offering a dynamic and fluid consumer health resource that is continually evolving. The content and structure of the web site has changed continually throughout the life of the project as part of an ongoing attempt to make the system more comprehensive and responsive to user needs. For the most part, changes to the system are driven by information gathered from a wide variety of sources including an online user survey, analysis of usage statistics, and informal collection of anecdotal feedback.

Although NetWellness was developed with public monies and currently enjoys ongoing support from the state, network administrators feel it would be extremely short-sighted to tie the future of NetWellness to public monies and are currently working on a plan to market the service as a commercial product to health care providers and employers. Because the NetWellness web site provides a valuable service by filtering out the questionable health information available on the Internet and providing a high standard of quality assurance for its resources, this next phase of the project is likely to meet with great success.

## **OVERVIEW**

### **Purpose and General Approach**

**Purpose of the Project.** NetWellness is a web-based consumer health information service developed by the University of Cincinnati Medical Center (UCMC) with many community partners. As stated in the TIIAP proposal, the objectives of this project are:

- To provide easy, equitable, and widespread access to health-related information resources to the general public in the Ohio Valley region, particularly rural Appalachian and urban minority populations.
- To provide comprehensive training programs for these health information resources by working with community and regional partners.
- To use the existing telecommunications and hardware infrastructure to extend health, educational, and community/public information resources to as many citizens of the Ohio Valley region as possible.
- To contribute to the comprehensive plan (OVCITP Universal Service and Interoperability Planning Grant) to extend the information superhighway to all citizens of the Ohio Valley region.
- To facilitate the development of managed health care by contributing to the health education and awareness of citizens of the Ohio Valley.

**Network Description.** The NetWellness database includes information from a variety of sources—textbooks, medical and professional journals, and research articles. It covers drug information, disease information, standard and alternative treatment information, and general health and wellness information. Information from the database and other consumer health services are made available to the public via a World Wide Web site, a network of public access sites throughout Greater Cincinnati, and the Ohio Public Library Network in the state's 700 public libraries.

Several resource features stand out among the NetWellness collection.<sup>1</sup>

- “Ask an Expert” features pharmacists, nurses, physicians, and other health professionals who provide answers to users’ health questions. The service is backed by the resources of the University of Cincinnati Medical Center and, therefore, presents a stability and authority that is lacking in many personal health discussion groups on the Internet. Since questions asked by one person may address the concerns of others, expert’s answers are posted in a bulletin board format so readers can review previous topics. All previous questions and answers are also fully searchable. The Ask an Expert service was among those requested most often in the pre-grant needs analysis, and it has proven to be one of the most popular.
- “HOPEline” is an interactive self-help resource for substance abuse and chemical dependency. It consists of four parts: Southwest Ohio Community Resources, General Information on Common Substances of Abuse, Self-Assessment Tests, and Ohio Department of Alcohol and Drug Addiction Services Directory. Textual material supporting these modules is stored in a relational database, and users search and read with the database through a locally developed interface. HOPEline was conceived and developed by the Cincinnati Drug and Poison Information Center. In exchange for receiving the information contained in HOPEline, NetWellness redesigned the database and developed an easier to use interface.
- “Hot Topics” link together a variety of NetWellness resources into categories. Depending on the topic, they may include an overview document, plus additional documents discussing subjects or issues relating to the topic. They may also include links to electronic texts, reference works, and professional databases where additional information on the topic may be found. Finally, many contain links to resources outside of NetWellness. As of winter 1998, there were 18 Hot Topic collections available with more in various stages of preparation:
  - Aging
  - AIDS
  - Arthritis/Rheumatologic Diseases
  - Brain Attack/Stroke
  - Breast Cancer
  - Cancer
  - Children’s Development and Health
  - Diabetes
  - Emergency Preparedness
  - Heart Disease

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<sup>1</sup> Not all NetWellness resources are available to all users of the system; some are licensed for use only at designated NetWellness public access workstations.

- Insurance/Health Plans
  - Lung/Respiratory
  - Occupational Safety and Health
  - Pregnancy/Breastfeeding
  - Smoking Cessation/Tobacco Abuse
  - Substance Abuse
  - Women’s Health
  - Wellness/Nutrition
- “In the News” provides up-to-date coverage of current health topics by indexing two web-based news services (CNN Interactive and USA Today Health) on a nightly basis. Users can search the index and link to articles on the latest health news. This can serve as a lead-in to indepth searches of formal information resources.

NetWellness also includes 25 medical books, over 300 magazines, thousands of consumer booklets from various organizations, and numerous health literature indexes, such as MEDLINE. A contents menu provides direct access to many individual resources and the Hot Topics. Resources created or provided directly by NetWellness (as opposed to commercial packages or off-site links) are searchable through a “Find” module.

**Proposed End Users and Other Beneficiaries.** Anyone with a connection to the World Wide Web can access NetWellness at <<http://www.netwellness.org>>. However, some resources are commercially licensed for specific public access sites and may be used only from those locations. The original public access sites are located in Ohio Valley, which encompasses southern Ohio from Marietta to Cincinnati, northern Kentucky, and southeastern Indiana. Many of the NetWellness public access sites were purposely located in rural areas in order to ensure that these traditionally disadvantaged populations would benefit from easy access to the system. In addition to the 45 public access sites in the tri-state area,<sup>2</sup> NetWellness is accessible to the public through Internet workstations that have been installed in each of the 700 public libraries in Ohio through a direct link on the OPLIN (Ohio Public Library Information Network) home page, <<http://www.oplin.lib.oh.us>>. Text-based versions of many NetWellness resources are also available through TriState Online, the Southeastern Ohio Regional Free-Net, and the Dayton Free-Net. Appendix A lists the 45 public sites where NetWellness workstations were in operation as of January 1998.

There is one additional and unique public access site located in a university hospital in the Republic of Georgia in Eastern Europe. A staff member from the UCMC Library worked on a temporary assignment at the hospital to help them develop a digital medical library. When she returned, she successfully encouraged local vendors in Cincinnati to supply the needed hardware to establish a NetWellness access terminal for the staff of the Georgia hospital.

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<sup>2</sup> Forty-three of the listed public access sites were created under the TIIAP grant. A supplemental grant from the National Action Plan on Breast Cancer provided two additional workstations.

## **Description of Grant Recipient and Project Partners**

**Grant Recipient.** UCMC responded to the original RFP and received the federal funds to develop NetWellness. UCMC is one of the leading academic health centers in the nation, ranked within the top 25 percent of research-based academic health centers. It is nationally acknowledged for research programs in biomedical-scientific areas such as basic biological research, molecular genetics, cancer, cardiovascular sciences, environmental health, neuroscience, and perinatology. The Medical Center consists of the Colleges of Medicine, Nursing and Health, and Pharmacy; the University of Cincinnati Hospital; the Paul I. Hoxworth Blood Center; and the Medical Center Libraries. The Medical Center Libraries, which serve the library, information, and technology needs of the Medical Center's faculty staff, and students of the Medical Center, played a primary role in planning and implementing the TIAP project.

UCMC has been responsible for (1) creating and identifying content for the NetWellness site, (2) evaluating the site's usefulness, (3) upgrading the system when needed, and (4) training staff at public access sites. In addition to planning and operating the project, UCMC houses the network servers.

**Project Partners.** The partner base was fairly stable in the beginning of the project, but as NetWellness became more widely known and as the federal funding came to a close, additional partners were added to the project to take advantage of a broader array of knowledge, information, services, and in some cases funding. The list of original partners includes 66 clinics, hospitals, libraries, businesses, educational institutions, and community and government agencies, the most significant being the following:

- Ohio University has been involved in supporting six of the original public sites. The Ohio University Medical Library also served as co-sponsor of the original grant proposal.
- TriState Online is a free-net that provides access to home computer users throughout Ohio, Kentucky, and Indiana. TriState Online was a subrecipient of the federal funds in exchange for providing a portion of the network infrastructure and also provided a great deal of technical expertise and in-kind management of the network's ISDN lines.
- Ohio Library Information Network (OhioLINK) operates a network of computers in academic institutions throughout the state that provide public access to NetWellness and other community resources.

As of January 1998, the following additional partners had become deeply involved with the project:

- Ohio State University develops original content and provides expert resources.
- Case Western Reserve University also develops original content and provides expert resources.
- Ohio Public Library Information Network (OPLIN) is funded by the State of Ohio to make NetWellness available to Ohio citizens in the state's 788 public libraries. Staff at each library are trained to use the system and asked to help visitors use the system.
- State Library of Ohio works with OPLIN to make NetWellness available to Ohio citizens at each of the state's public libraries.

- Cincinnati Bell Telephone provides assistance with telephone lines (ISDN) and cable equipment to allow the network to be installed throughout the state.
- Cincinnati Drug and Poison Information Center (DPIC) developed HOPEline, an interactive self-help resource for substance abuse and chemical dependency that has become one of the most acclaimed resources on NetWellness.
- Ameritech provides the wireless connection for the NetWellness public computer in the University of Cincinnati Barrett Cancer Center Education van.
- Sybase contributed to the project as an equity partner by discounting its relational database software by 80 percent.
- The Southeastern College and Continuing Education Coalition in southeastern Indiana assisted with training activities at public access sites in southeastern Indiana.
- The Indiana University School of Medicine Ruth Lilly Medical Library also assisted with training activities at public access sites in southeastern Indiana.
- Print First provided discounts on printing the user guides.
- NSCA Mosaic provided Mosaic browser for the public workstations and furnished NetWellness developers with its source code so that the browser's icon selection and appearance could be altered to meet the network's usage and security needs.
- The Cincinnati Children's Hospital Medical Center, with NetWellness training and consultation, is converting 300 "Parent Education Pamphlets" to the web, and allowing direct access from NetWellness.
- Ebsco offered discounts on subscriptions.

A number of additional partners have provided assistance in developing the site's numerous Hot Topic areas.

- Arthritis Foundation - Ohio Valley Chapter provided over 70 pamphlets to a Hot Topic feature on Arthritis and Rheumatological Diseases.
- The Greater Cincinnati Breast Cancer Alliance provided suggestions for additions to the Breast Cancer Hot Topic.
- The National Stroke Association provided six pamphlets for the Brain Attack/Stroke Hot Topic which describe crucial warning signs and how to reduce the risk of Brain Attack/Stroke.
- The American Lung Association provided its consumer pamphlet series for the Lung Disease Hot Topic.



**Project Staff and Their Roles.** The Principal Investigator of the TIIAP grant was the Director of the Medical Center Libraries at the University of Cincinnati.

Co-Principal Investigators listed in the proposal include:

- The Assistant Dean of Libraries and Director of the Health Sciences Library, Ohio University;
- The Associate Senior Vice President and Associate Director of University Hospital Computing Services, University of Cincinnati;
- The Assistant Dean for Continuing Medical Education at the College of Medicine, University of Cincinnati;
- The two Associate Directors of the Medical Center Libraries, University of Cincinnati; and
- The Associate Director of the Drug and Poison Information Center, University of Cincinnati.

Other collaborators on the project include:

- The CEO of University Hospital, University of Cincinnati;
- The Senior Vice President and Provost for Health Affairs at the University of Cincinnati;
- The Dean of the College of Medicine, University of Cincinnati;
- The Dean of the College of Nursing and Health, University of Cincinnati;
- An Associate Senior Vice President at University of Cincinnati;
- A representative from TriState Online;
- The Director of the Drug and Poison Information Center, University of Cincinnati;
- The Dean of the College of Pharmacy, University of Cincinnati; and
- The President of University of Cincinnati Medical Associates.

Many new positions were created within the UCMC Libraries to implement the NetWellness project. The majority of these positions were part time and continued beyond the grant period using alternate funding sources. These positions tended to be filled by individuals who were already employed at the University of Cincinnati or were students there. In addition, the job responsibilities of many library staff were expanded to include NetWellness-related activities. The main categories of project staff include the following:

- Project management includes the Director and an Associate Director of the UCMC Libraries who work together to identify and negotiate partnerships and to oversee general operations. The library director spends approximately 20 percent of his time on project related activities; the associate director spends approximately 80 percent of his time administering the NetWellness project.

- The technical team consists of two half-time database developers and two half-time systems analysts who are responsible for installing and testing the commercial databases, coordinating the development of system design and interface, developing access means to the databases, and planning and implementing public access sites and three one-third time programmers. Also, for 2 months, the systems manager of the Faculty of Basic Medicine at Moscow (Russia) State University assisted in systems development.
- The training team consists of a full-time librarian/training coordinator and four quarter-time staff who work with the public access sites on site preparation and implementation.
- A three-person content team review and select health information resources and design the site's user interface.
- A two-person financial team coordinates purchasing and manages the project budget.
- A publicity team of three individuals coordinate conference papers, presentations, and public communications.
- The evaluation team included experts from University of Cincinnati Institute for Nursing Research, Institute for Policy Research, Program for Health Planning, and College of Design, Art, Architecture and Planning, under the direction of an administrator from the UCMC Library.
- A continually growing network of pharmacists, nurses, and physicians contribute to the project by providing content for the Ask an Expert feature of NetWellness.
- Lastly, a 42-member Steering Committee has been formed to provide long-term direction and to review project development for content accuracy and appropriateness. Committee members represent a broad spectrum of consumers, health care providers, vendors, and public access sites.

## **Project Costs**

In addition to the \$375,000 TIIAP grant, NetWellness has received funding from many sources.

- Since July 1995, NetWellness has received funds each year from the State of Ohio: \$150,000 in FY96; \$150,000 in FY97; \$650,000 in FY98; and \$650,000 in FY99.
- UCMC provided \$200,000 of university funds.
- The National Action Plan on Breast Cancer provided a grant of \$123,000 to develop a Hot Topic area on breast cancer.
- Cincinnati Bell Telephone provided \$70,000 worth of ISDN circuits and standard phone lines.

## **PROJECT CONTEXT**

### **Community Description**

In its initial project implementation, NetWellness primarily supported the delivery of electronic health information to rural residents of Southern Ohio and urban and suburban communities in the Greater Cincinnati tri-state region (Ohio, Kentucky, and Indiana). The total population in this service area is 3,423,004 persons (1990 Census). In its current implementation, NetWellness is delivered to all of Ohio's public libraries. It is important to note that Ohio has one of the strongest statewide public library systems in the country and is widely regarded as an innovator in online information services. Over 60 percent of the state's residents use the public libraries on a monthly basis.

### **Status of Telecommunications/Information Infrastructure Environment Prior to the TIAP Project**

The TIAP grant enabled the creation and development of the NetWellness consumer health information web site and the installation of 43 public access sites throughout Greater Cincinnati. A variety of related projects have allowed NetWellness to grow beyond the scope outlined in the original TIAP grant.

A collaboration among NetWellness, OPLIN (Ohio Public Library Information Network), and the State Library of Ohio made NetWellness available through Ohio's 249 public library systems in each of the state's 700 community libraries. In this collaboration, the University of Cincinnati receives operating funds from the state to provide access to NetWellness through OPLIN, taking advantage of a state contract that allows any state agency to get a (distance insensitive) T1 line at a much reduced cost.

OhioLINK, another library-based project funded by the state government, provides access to a multiplicity of resources locally and statewide. In addition to a NetWellness link, it provides information on library holdings (books, journals, and audiovisual materials), access to research databases, and gateways to a myriad of other resources, and forms communications links with the libraries of document delivery, professional information, and reference services. The UCMC libraries played a significant role in the development of this system, and the University of Cincinnati was the first site to implement the OhioLINK central catalog.

TriState Online, the local free-net, offered access to NetWellness resources to all its members. Since the cost of membership is nominal, virtually anyone with a home computer in the Tri-State region could have access. The Southeastern Ohio Regional Freenet and the Dayton Freenet offered the same access to residents of the southeastern Ohio counties and the Dayton (Ohio) metropolitan area that they serve.

## **PROJECT IMPLEMENTATION**

### **Activities/Milestones that Occurred Prior to the TIAP Grant Period**

The idea for an online consumer health resource came about during a staff meeting discussion at the UCMC Library about how to deal with the "exploding" number of people from the general public who were using the library's resources. UCMC libraries have a long history of providing consumer health information to the general public of the region. The TIAP grant appeared to be an ideal opportunity to address this problem in a novel way. Initial project planning began in the spring of 1994, culminating in a grant proposal to the NTIA/TIAP in May.

NetWellness was conceived to provide a quality-filtered selection of consumer-oriented health information resources, that would serve the expressed needs of the community as determined by (1) an online survey of TriState Online users, (2) interviews with the nurses and physicians of an inner-city clinic, and (3) a focus group with representatives from most of the proposed public access sites to get their initial input on site needs. This needs assessment revealed seven preeminent health information needs:

- Drug information,
- Disease information,
- Physician referral/find the expert,
- Wellness/general health,
- Alternative therapies,
- Insurance/health planning, and
- Health literature.

The Health Information Resources Selection Committee then reviewed 75 electronic health information resources, assessing their value based on relevance to the results of the needs assessment. The review focussed on resources not available readily from another site via the Internet using criteria previously developed and successfully used by the UCMC Libraries for the selection of other electronic resources. A selection of 15 resources directly meeting one or more of identified needs was proposed in the original Federal grant request. Once the grant was awarded, the selections were reviewed and the collection was expanded to account for changes in the information marketplace.

Providing the general public, particularly rural Appalachian and urban minority populations, easy, equitable, and widespread access to electronic health information resources had not been attempted on a large scale prior to the NetWellness effort. Several approaches were conceived by the NetWellness team to provide access to their broad target population:

- Free-Nets and community networks could provide access to virtually anyone with a home computer in the tri-state region for a nominal membership fee.
- Public access workstations could provide access to those persons who do not own personal computers. These workstations are located in libraries, health clinics, hospital lobbies, senior centers, pharmacies, community centers, and a mobile cancer-education van.
- The Internet could provide access to any computer user around the world.
- Person-to-Person Service could supplement the electronic drug information resources with a telephone-based service in which pharmacists provide information via an 800 number and electronic mail.

Issues of disabled users were not considered at the outset of the project, but the NetWellness team is continually looking into ways to provide workstations that are handicapped accessible.

It should be noted that the NetWellness project was originally designed to be one of four conceptually linked TIIAP proposals in 1994 that were intended to share infrastructure and other resources. The first of these other Cincinnati-based projects was focused on education, the second on government, and the third on health practitioners. Of the four interlinked proposals, only the UCMC proposal for establishing NetWellness was awarded.

### **Activities/Milestones that Occurred During the TIIAP Grant Period**

NTIA made the award in October 1994. In June 1995 an initial suite of consumer health resources was made available to users through TriState Online and through the World Wide Web. The NetWellness site grew and evolved throughout the grant period as new features were developed, new links established, and existing resources refined. The appearance and navigation process was also being continually improved. Installation of public access sites began in July 1995 and was completed by August 1996. The grant period ended in September 1996.

### **Steps Taken to Sustain Project Activities Beyond the TIIAP Grant Period**

Fundraising efforts drawing on the strength of the partnerships have been conducted at the state and local levels throughout the grant period in order to ensure that NetWellness would continue to be available after the grant period ended.

Fundraising efforts to sustain the network have been very successful, and the project was thriving at the time of the site visit in January 1998. One of the most important sources of ongoing funding has been the State of Ohio, whose support can largely be attributed to a single member of the Ohio House of Representatives who is particularly impressed with the network's capacity to empower people to improve their health and their lives. Thanks to her efforts, NetWellness is a line item in the state budget. The costs of maintaining information resources, access, and training programs for project are also being funded through vendor support and through cost sharing among project participants and the governmental jurisdictions of the region.

However, because NetWellness is such a large and expensive operation and none of the current funding sources are guaranteed to last, the NetWellness team is looking into various additional strategies for generating income. The most promising of these strategies involves selling direct NetWellness accounts on the open market. A few doctors' offices have expressed an interest in establishing a dedicated terminal with a direct connection to NetWellness and the NetWellness team believe that with a targeted marketing effort, other organizations would be interested establishing their own NetWellness connection. Negotiations are also underway with Proctor and Gamble, the largest company in Cincinnati, to offer NetWellness accounts to employees as a benefit in exchange for underwriting certain services. Another avenue being explored involves using advertising to underwrite various features.

### **Activities/Milestones that Occurred Following the TIIAP Grant Period**

The NetWellness team has continued to receive requests to add public access sites throughout the tri-state area. Technical consultation is provided to those potential sites that are able to purchase the necessary hardware and telecommunications to establish their own site. For potential sites that don't have the needed financial resources, the NetWellness team is willing to assist in locating potential funding sources and preparing grant proposals. For example, the NetWellness team assisted the Rural Ohio Valley Health Sciences Library Network in preparing a grant proposal to the Appalachian Regional Commission for providing Internet access to five rural Appalachian hospitals in southern Ohio and for increasing the

capacity of the Southeastern Ohio Regional Free-Net. The project would provide access to NetWellness in those hospitals. In another example, the NetWellness team integrated access to the network into a grant proposal to the Rural Electrification Administration to create a Telemedicine and Distance Learning Network between the University of Cincinnati and Adams County, one of Ohio's poorest and least accessible counties.

One of the largest activities being implemented after the TIIAP grant period ended is SchoolNet, a statewide initiative to wire every public school classroom in Ohio and to equip many of them with workstations. The NetWellness team is planning ahead for this initiative by developing a child-oriented page on the NetWellness site that is tentatively being called For Kids By Kids. Students in schools throughout the state are being asked to think about what topics they want to be included on the site and how to develop "attention-focusing activities" to motivate students.

## **Issues**

**Comparison Between Project as Originally Proposed and What Actually Happened.** NetWellness was originally known as the Ohio Valley Community Health Information Network. The name was changed to better reflect the network's mission to provide an expanding selection of high quality health and wellness information resources, based on users' expressed needs. Furthermore, a name without regional identity was sought to create more universal appeal in the open market. At the time the network was renamed in March 1996, the World Wide Web address was also changed to be easier to remember ([www.netwellness.org](http://www.netwellness.org)).

In the original proposal, NetWellness was to be linked to TriState Online, SouthEastern Ohio Regional Free-Net, and the Dayton Free-Net, and through them to other community networks. However, because not everyone in the tri-state area has a computer or access to suitable telecommunications service, a revised proposal was developed which incorporated placing a series of public access workstations in publicly accessible locations throughout the region.

Also at the time the initial grant proposal was written, all information resources were expected to utilize text-based interfaces. In late 1994, when the project was funded, technical needs were reexamined. The need to accommodate alternative interfaces required by the selected information resources, and the emergence of the World Wide Web as a means of disseminating graphic information widely, led to the decision to adopt a web-based model for NetWellness. Several times throughout the history of the project, the NetWellness team further improved the screen designs based on user suggestions and staff experience. In the first major redesign, text-based browsers were replaced with graphic web browsers. A second redesign involved the incorporation of frames. In general, the redesigns were reported to have resulted in:

- More efficient and flexible paths to the information resources;
- A cleaner, warmer, more pleasing appearance;
- Graphics with a more universal, less regional appeal;
- More flexible arrangement of resources under Hot Topics; and
- A more intuitive design for the occasional user.

The content of the web site also changed and evolved continually throughout the life of the project, for the most part making the system more comprehensive and responsive to users than the project team had

originally anticipated. Resources accessible via the Internet, for example, turned out to be a larger than expected source of information due to the exponential growth of the Internet. A great deal of consumer pamphlet information that could be retrieved from Internet sources were therefore integrated into the system. Furthermore, as the World Wide Web emerged to be an effective mechanism for disseminating information widely and clearly, developers were able to produce much more original content than they had originally conceived. The Ask an Expert feature offers one example of original content produced for the system. As another example, several NetWellness partners evaluated and identified a variety of materials and services from responsible charitable and governmental research organizations, which the NetWellness team converted to hypertext for incorporation into the Hot Topics features. NetWellness now contains hundreds of consumer pamphlets, health guides, reference works, article databases, and resource directories—many of them made available on the Internet for the first time, or exclusively, through NetWellness. Converting this large number of materials to hypertext served to strengthen the project's consumer focus.

Similarly, resources occasionally had to be dropped at various times throughout the project. Some resources were difficult to incorporate technically into a networked environment, and others were not licensed by their publishers for use in a large-scale environment such as NetWellness. For example, the In the News feature of NetWellness originally indexed Time Daily and Reuters Medical News. But after it proved difficult and expensive to index the health topics in these services, both were discontinued. Whenever services were dropped, project staff worked to find additional titles to fill in the gaps and to address emerging health information needs.

Operational procedures for the most popular NetWellness feature, Ask An Expert, have changed considerably as well throughout the life of the project. More and more experts are working in teams (the epilepsy team, for example, consists of a physician and a pharmacist) and establishing streamlined procedures and protocols for responding to public questions, thereby making it easier to facilitate and provide responses to frequently asked questions. The database of previously asked questions can now be searched and expert teams are developing listings of frequently asked questions to help alleviate the burden of redundancy on the experts.

Several modifications to the technology specified for use in the original proposal were made during the implementation phase to account for advancements in the field. The original proposal called for a Digital Alpha computer as the central server but when it was decided that the emerging World Wide Web protocol represented the best environment for developing and disseminating the desired information resources, the market was re-examined. An integrated World Wide Web development package of software and hardware based on Silicon Graphics "Indigo" server was selected. Over time, additional Pentium-class computers have been acquired as "production servers" so the Silicon Graphics server remains primarily a development platform.

The original proposal also specified Macintosh PowerPC workstations for the public access sites. A re-examination of the marketplace when the grant was awarded suggested that Windows NT client-server and peer-to-peer computing strategies provided the robust environment needed for the multi-type network architecture envisioned. The final workstation configuration adopted for the NetWellness public access sites includes a Dell Pentium 90 running on Windows NT and Mosaic client software.

**Utilization of Services by the Direct End Users.** Involvement of an active public relations team helped to inform potential end users about the NetWellness services while simultaneously generating interest within the community for prospective partnerships:

- Metropolitan and community newspapers throughout the region were kept apprised of the project and its major milestones and accomplishments. When new sites were installed, local newspapers and television stations often covered the event.
- Many project partners have helped market the service. For example, Cincinnati Bell has featured NetWellness in newspaper ads and in its corporate newsletter. And OPLIN has conducted several press conferences about the NetWellness stations in the public libraries.
- NetWellness team members present demonstrations of the network to numerous community and professional groups and individuals on site at the UCMC. From these and other efforts, case reports have appeared in peer-reviewed publications and trade publications at the local, regional, and national level.
- NetWellness published a bimonthly newsletter to keep the NetWellness public access sites and other people who are interested in access to consumer health information aware of project planning and progress.

In general, the skills needed by end users are very minimal; however, because a number of resources on the network are fairly sophisticated, a multifaceted training effort has been implemented to meet the needs of the diverse users among the general public.

In-person/on-site efforts by the NetWellness training team were reported to be the most practical and effective training approach. Utilizing a train-the-trainer model, someone from the NetWellness training team conducts an initial training session for personnel at each public access site shortly after equipment installation. A followup session is also conducted within a few weeks. The personnel trained at each site are then responsible for subsequent training of additional staff members or public users at their site. Many library sites integrated NetWellness training into their staff development program. And a few libraries have offered formal training sessions in using NetWellness to the public; however, the policy in most libraries is to work one on one with the public as needed. NetWellness sites in busy medical clinics and offices typically offer limited training opportunities. A senior center in Cincinnati came up with a novel training approach that used elementary school children to teach seniors how to use the system.

Trainers are also responsible for maintaining contact throughout the project and serving as the sites' primary contact with the project. In this way, both content and technical problems can be tracked on the sites' behalf through a single content person. To supplement the onsite training efforts, three training manuals were created: "NetWellness User's Guide," "Quick NetWellness," and "NetWellness Remote Access Guide." Electronic versions of these print guides are accessible from the web site. Numerous context-sensitive online help instructions are incorporated into the website.

The NetWellness team also developed several videotape and broadcast productions in conjunction with Channel 48 WCET and several Cincinnati-area community video organization partners. A series of three training tapes was produced: "NetWellness Basics," "Advanced NetWellness," and "How to Find Information on Diseases and Disorders using NetWellness." Each public site received copies of these tapes for local showing and to loan to the public. In addition, WCET produced a live call-in program for their community access channel in which callers could ask questions about using the network. The show was



recorded and has been rebroadcast on the Intercommunity Cable Regulatory Commission and Cincinnati Community Video community access channels. Nevertheless, this and the other training videos are not considered to be an ideal training format because they become outdated very quickly due to the rapid advances of telecommunications technologies and the NetWellness network itself. In addition, the videos are expensive to update, copy, and distribute. Consequently, the emphasis of the training efforts has shifted toward improving the online help screens.

In an attempt to institutionalize NetWellness within the UCMC community, UCMC education staff have incorporated NetWellness training into four ongoing medical informatics courses:

- Clinical Informatics (for fourth year medical students)
- Primary Care Residents Informatics (year one and two residents)
- Internal Medicine Residents Informatics (year one residents)
- Nursing Informatics for Scholarly Inquiry (required by master's nursing students)

## **Problems**

Maintaining solid communications with partners was reported to be the most critical and difficult aspect of the NetWellness project, especially because the partners were extremely varied and geographically dispersed. As an example, a key partner, Ohio University, withdrew from the project for a short time in response to political difficulties and miscommunications stemming from a rejected TIIAP proposal submitted by the Ohio University College of Osteopathic Medicine. A lengthy series of meetings between the NetWellness Principal Investigator, the University of Cincinnati government relations team, and the Dean of the Ohio University College of Osteopathic Medicine was required to resolve the matter before Ohio University would rejoin the NetWellness team. The lesson gleaned from this episode is that partnerships are very fragile even with solid political underpinnings based on openness, honesty, and trust, thereby threatening the economic and technical viability of the project.

Significant community segments that are missing from the NetWellness partnership include the City of Cincinnati, pharmaceutical companies, certain state agencies, and managed care organizations. The main reason that managed care organizations have thus far not been actively involved in the NetWellness project has to do with the bottom line emphasis of managed care business operations. However, the NetWellness team hopes to develop active partnerships with the leading managed care organizations in the area by educating industry leaders that the NetWellness concept fits well with the managed care paradigm because it frees up health care providers to deal with patients efficiently.

High turnover has been a problem among the technical staff, who primarily come from the student population. Nearly a dozen systems engineers have left to pursue more lucrative opportunities since the project began, and the engineering team has never had a stable person in the senior position. NetWellness administrators have responded to this problem by maintaining a close and intimate relationship with the staff.

Another significant challenge facing NetWellness concerns keeping the material current and finding quality information, especially on topics of great interest to the users such as alternative medicine and health insurance. The exponential growth of Internet resources has been a great boon in this respect, although it is

reported to be a two-edge sword. The NetWellness team appreciates having access to the additional resources available on the Internet, but the volume of information is often difficult to review and evaluate.

Because of the growing amount of controversial resources available via the Internet, the NetWellness team has had to work hard to prevent access to such material from the network. Ohio was reported to be a conservative state with a very vocal opposition to allowing open access to Internet for children. Consequently, content reviewers evaluate every web home page with a link from NetWellness to ensure its quality. Nevertheless, many legitimate health issues deal with controversial topics such as human sexuality or substance abuse. The NetWellness team has appropriately responded to this problem by incorporating into the system a disclaimer that warns the user of potentially controversial material. The public access sites are further informed that they are responsible for monitoring access based on their knowledge of the resources and the values of their community. According to library staff at the one public access site we visited, it is a constant challenge to keep children from accessing sexually explicit materials on the web in general.

Of greater concern than users accessing controversial materials are the potential liabilities of offering unmediated health information and an Ask the Expert electronic bulletin board service to the general public. With the assistance of University of Cincinnati legal counsel, the NetWellness team developed disclaimer and user expectation statements that are strategically displayed throughout the system design. To encourage users to read it, the disclaimer appears as the initial screen to each resource and all references to it read "Using the Information."

Another legal issue has arisen when some commercial vendors raised concerns about the extensive networking of their products within NetWellness. In some cases the vendors' concerns could be alleviated; but in other cases, effectual databases had to be dropped from the network or replaced by ones meeting similar needs without the networking restrictions.

The physical security of project hardware has been an issue in some sites such as a pediatric center in which someone was repeatedly stealing mice and CD-ROM drives.

## **PROJECT ACCOMPLISHMENTS AND IMPACT**

*I want to thank you for providing this service on the Internet! The presentation was very easy to use and thorough, especially with the cross-reference articles. This service is the best that I've found on the net and is a site I will use for future reference.*

Unsolicited user comment (11/4/96)

*Just a note to say thanks for the service. It's really helpful for a patient to be able to read some basic background information. Seeing the doctor is obviously vital, but doctors often don't have more than a few minutes to give you and therefore don't have time to explain the background fully. I found just what I was looking for via an Altavista search that brought me to your site.*

Unsolicited user comment (12/15/96)

NetWellness staff believe with good reason that theirs is the premiere consumer health network in the world serving the online and potentially online communities. In contrast with other consumer health networks such as Intellihealth, which is run by Johns Hopkins Medical University, and Mayohealth, which is run by the Mayo Clinic, NetWellness provides more responsive Ask an Expert service. Information available

through NetWellness is either created by or evaluated by a team of highly qualified experts, namely the nurses, physicians, and pharmacists of the University of Cincinnati, Case Western Reserve University, and the Ohio State University. Using the “Criteria for Assessing the Quality of Health Information on the Internet,” which was created by a consortium of health care organizations, NetWellness experts rigorously evaluate the network’s content to make sure it is reliable and useful.

The consumer health network has been recognized with several honors and awards:

- In 1998, NetWellness received the Aesculapeus Certificate of Merit from the Health Improvement Institute.
- NetWellness received the 1997 ISI/Frank Bradway Rogers Information Advancement Award, issued by the Medical Library Association. The award, cosponsored by the Institute for Scientific Information (ISI), recognizes “outstanding contributions to the application of technology in the delivery of health sciences information, to the science of information, or in the facilitation of the delivery of health sciences information.”
- Lycos recognized NetWellness with its “Top 5 percent of the Web” award. *USA Today* named it a “Hot Site.”
- NetWellness was named as a semifinalist in the 1996 National Information Infrastructure (NII) Awards Program,<sup>3</sup> and a finalist in the 1997 Global Information Infrastructure Awards program.
- A NetWellness poster session entitled “Ask an Expert: Partnering Via the Web” received the Outstanding Innovative Program Poster Award at the 1997 conference of the Association of Women’s Health, Obstetric, and Neonatal Nurses.

### **Technology-Related Accomplishments**

At the time of the site visit in January 1998, NetWellness was accessible from more than 6,000 computers in public libraries throughout Ohio. Usage statistics show that people use a NetWellness resource nearly 400,000 times each month from all 50 states, all Canadian Provinces, and over 50 countries. In the early days of the project, people connected to the university infrastructure were the main users. But as the project has grown and as more and more computers are installed in classrooms and public libraries, the user base includes more children and more members of the general public.

### **Impact of the Project on Direct End Users**

Overall, NetWellness provides a level of quality and quantity of content far beyond what was specified in the TIAP grant proposal. It features an expanded topic coverage, expanded resources to address those topics, and expanded involvement from experts in participatory as well as advisory roles. The Hot Topics organization of the website is intentionally fluid, serving the needs of consumers as their needs for information change.

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<sup>3</sup> It is interesting to note that the winner of the 1996 NII Award for the health category was another 1994 TIAP grantee, the Applied Informatics project of Columbia University.

An informal analysis by project staff of the questions being submitted to Ask an Expert showed that the majority of questions are relatively complex and sophisticated. The NetWellness evaluation team also monitors the number of questions being submitted, the types of questions being asked, the time and resources used to answer questions, and the number of questions asked that could have been answered using other NetWellness features. The results of these monitoring efforts are used to make the Ask an Expert response process more efficient, and to determine which questions should be included in a “Frequently Asked Questions” section of a particular hot topic.

### **Impact of the Project on Other Beneficiaries and/or the Overall Community**

NetWellness provided numerous benefits to the planned and existing telecommunications infrastructure in the Ohio Valley region. For example, NetWellness has proven to be compatible with other technology initiatives in the state, such as wiring all public libraries and public schools to the Internet and the availability of local free-nets. Project staff attribute these partnerships largely to the national recognition afforded to the project by the TIIAP award. The federal funds were also said to have served as the catalyst for attracting additional financial support for network expansions. Project staff noted that the timing of the grant money was ideal, coming at a time when the state was giving a great deal of support to online automation, and at a time when the number of requests from citizens of the region for health information was rapidly growing.

NetWellness is on the verge of expanding its visibility and impact on the national level as well. The Public Library Association (PLA), through a planning grant from the Robert Wood Johnson Foundation, is studying the possibilities of creating a national consumer health resource. Staff from NetWellness have shared information with PLA and intend to pursue additional ways to integrate the Network into the national plan.

### **Impact of the Project on Grant Recipient and Project Partners**

University-level support of the network is provided as a community service because University administrators believe that NetWellness has given their institution statewide, and even worldwide, recognition. In fact, several independent web sites have set up “hotlinks” to NetWellness including the home pages of Wright Patterson Air Force Base Medical Center, Ohio Public Library Information Network, HealthWeb, and Health Finder.

All partners in the project are acknowledged on the NetWellness site, with hotlinks to their home pages when they exist. In a few cases, NetWellness staff have created one-page home pages with limited information for key partners lacking a home page of their own.

Multi-university partnerships and doctor-nurse partnerships on the Ask An Expert feature have helped the physicians involved learn how to communicate medical information to the lay public in a more meaningful way. Breaking down and simplifying complex medical information and dealing with the emotional component is typically a nursing skill set; however, the doctors involved in Ask An Expert report that their involvement has led to a greater realization of the importance of these skills.

Public libraries are one of the key partners in the initiative because some library patrons have had a great need for medical information and are often more comfortable asking medical questions to librarians than doctors. Prior to NetWellness, library patrons relied on reference books such as the *Merck Manual* which tend to become quickly outdated, and journals such as the *Journal of the American Medical Association* which are expensive to keep in the collection. According to respondents working in a Cincinnati public

library, NetWellness offers a broader array of more current information and is more cost effective than maintaining books, journals, and vertical files of similar information. However, the online versions of certain resources, such as the *Physicians Desk Reference* and the *Consumer Reports* Drug Write-up, are reportedly not very efficient or easy to use compared with the book versions of the same resources. Despite these small limitations, library staff believe that more users are making use of the resources available through NetWellness than had made use of previous forms of consumer health information. The most frequently used features of NetWellness among library patrons were reported to be the magazine indexes, fact sheets (especially those provided by the National Institutes of Health), the Health Reference Center, and the link to Children's Hospital pamphlets. In contrast with most home users of NetWellness, library patrons do not use the Ask an Expert feature very often because they want information immediately and often don't have the option to come back the next day to retrieve their answer. Medline is also not heavily used by patrons, perhaps because it is geared toward health professionals rather than the lay public.

Library staff at the site we visited report that patrons have been very positive about NetWellness. It was also reported that usage of the library's NetWellness terminal has steadily increased since it was first installed in January 1997, although no formal documentation has been compiled to support this observation. The typical users of NetWellness in the library were reported to be females between the ages of 30 and 50, a smaller number of elderly patrons, and occasionally students working on school projects. Approximately 80 percent of NetWellness station usage was by the public and 20 percent by library staff, although the trend is toward more public usage.

The librarians we spoke with appeared to be very adept in using NetWellness. They use a one-on-one approach for training the public in the use of the system, carefully assessing patrons' comfort and ability level so as not to overwhelm them. It was reported that there has never been a patron at this particular site who was unable to learn how to use the network. Since they were the first branch in the 7-branch library system to have NetWellness installed, the librarians at this site were responsible for training librarians at the other branches when their NetWellness stations were installed. In addition to training on an as-needed basis, library staff have conducted training for:

- The Board of Trustees of the local library system;
- A group of local health care providers;
- A group of social service agency personnel; and
- A group of nursing students.

### **Project Goals Not Met**

One goal of the project was to penetrate into the urban black communities of Cincinnati, where residents typically have minimal access to the information infrastructure. The NetWellness team has thus far been unable to tell whether or how well the project has achieved this goal, although there is limited anecdotal evidence of particular individuals or underserved groups gaining access to and effectively using NetWellness. Five of the original 40 access sites were located in underserved areas including three public libraries, one hospital, and one senior center. The NetWellness team is looking into tying subscriber addresses to census data using GIS tracking software to get a better description of the system's user base.

Another goal of the project was to improve access to consumer health information among residents of rural portions of the tri-state area. But because the technologies involved in providing rural telephone service

have not witnessed the same rapid advances that other technological areas have experienced, design and implementation issues involving rural telephone systems have consumed inordinate amounts effort and contributed to a diminished level of service delivered to portions of the NetWellness target audience. For example, NetWellness developers encountered several situations in which the telecommunications infrastructure in rural areas was not robust enough for efficiently operating public access workstations. To make the systems in these areas more user friendly and to reduce the amount of effort site personnel would need to spend maintaining their workstations, developers tried to automate as much as possible the autodial, autoconnect, and other operations that would otherwise require human intervention.

### **Impact of TIIAP Support on the Initiative**

The TIIAP grant money is considered by project staff to have positively affected the opportunities for area consumers to obtain health information. Without the TIIAP award, project administrators do not believe that NetWellness would have been created. In fact, none of the three conceptually related but unfunded 1994 TIIAP proposals from the Ohio Valley region have made any significant progress.

## **EVALUATION AND DISSEMINATION**

### **Evaluation**

The NetWellness evaluation team reports adopting a continuous quality improvement approach to decision making that includes gathering data from as many people and sources as possible. The four major activities that have been used to evaluate the network include the following:

- **Online Survey.** An online survey was conducted with the intent of measuring behavioral changes that have occurred as a result of utilizing the NetWellness consumer health resources. A total of 307 NetWellness users completed the survey during the 3-month period in which participation was solicited via the web site. Although the majority of respondents tended to view the system favorably and a few reported that NetWellness has improved their relationships with their doctors, the quality of information was seriously compromised by the large number of first time users participating in the survey. Another limitation was that the evaluators couldn't determine whether a given respondent was from a public access site or a home user. The evaluation team is planning to attempt the survey again using a more structure sampling approach in which first time NetWellness users would be screened out and users with specific characteristics would be targeted.
- **Raw Data.** The evaluation team has examined the number of hits within the network to monitor changes in usage over time as network features change and evolve. The results of this analysis show that Ask an Expert is clearly the most popular service on the network and deliberate monitoring of this feature has allowed the NetWellness team to expand the service to better meet user needs. The primary limitation of the project's analysis of system usage is that it has proven difficult to compare the utility of NetWellness with other consumer health resources or web sites.
- **Pattern Data.** The evaluation team purchased a software package called Interse, which uses complex statistical algorithms to analyze patterns of system usage. The team is impressed with the potential of the software package to track usage of system resources, but unfortunately, there is a steep learning curve associated with this software package and the evaluation team has made only rudimentary use of it. One possibility being pursued involves

supporting a Ph.D. candidate in computer science to develop a research project using the software package.

- **Anecdotal and Feedback Information:** The evaluation team has formally encouraged the coordinators at each public access site to collect and report feedback about how NetWellness is being used. The team also directly collects feedback from system users via frequently appearing notices and information bullets throughout the system's structure that provide means for users to offer comments and suggestions. The information collected from these channels is then categorized and forwarded to the appropriate content coordinators. Most of the feedback received concerns technical issues rather than content issues. However, many significant changes to the system have been initiated by user comments or suggestions. For example, many early users requested that the system incorporate more focused resources on specific topics, leading the NetWellness team to develop the Hot Topics feature. As another example, the appearance and structure of the system has been improved based on user comments—screen designs have been made more attractive, numerous additional paths to the information resources have been integrated, and the phrasing on buttons and menu lines has become more descriptive and accurate.

NetWellness staff are clearly committed to involving a wide range of constituencies in the evaluation process and to utilizing formal channels for collecting community input data. However, there are significant weaknesses in the evaluation activities that have thus far taken place. One of the primary weaknesses stems from neglecting important sources of information, most notably library staff and other coordinators at the public access sites. For example, the library staff we met with reported feeling “left out of the loop” as the network interface and features constantly change and evolve. Although the public access sites are an essential component of the network for reaching disadvantaged members of the tri-state community, librarians and other public access site coordinators are often caught off guard trying to help a community member access a well-used NetWellness feature that has unexpectedly been changed or discontinued. Well-used network features that have been discontinued include the Personal Medical Advisor, access to the University of Cincinnati library catalogue, and several links to other consumer health sites. In a related issue, there are a few cases in which the hard copy format of reference materials (such as the *Merck Manual* and USPDI) are significantly easier to use than the online versions, but library budgets are starting to discontinue these hardcopy reference works because they are available online.

Additional weaknesses of the evaluation efforts concern the limited data that have been collected on user demographics, the reasons people use the system, and the benefits people gain from using the system. The evaluation team recognizes these limitations, and with funding from the State of Ohio, it hopes to work with public libraries in the development of an impact assessment of NetWellness. The evaluation team is also working to get students from Kent State University involved in the evaluation because the Testing Center at Kent State University has recently integrated the evaluation of electronic resources into their curriculum. The evaluation design will involve another online survey using an improved methodology to determine background characteristics of the user base, identify indicators of behavior change, and document the consequences of the information received through NetWellness. Focus groups with NetWellness users will be conducted to complement the survey findings. The ultimate question that the evaluation will try to answer is “What health-related behavioral changes take place in the people who use NetWellness?” The main challenge facing the evaluation team as they work to design the evaluation is to collect accurate and reliable information without discouraging or inconveniencing users by interrupting their work.

## Dissemination

**Publications, Presentations, and Demonstrations.** Evaluation results and descriptions of the telecommunications initiative have been widely disseminated. As the partial listing of publications and presentations about NetWellness in Appendix B demonstrates, NetWellness staff have published an impressive number of articles in peer reviewed information service and technology journals, and have been equally active in making presentations at professional conferences.

**Publicity.** The NetWellness team has done an exceptional job of using the press to establish themselves as a reputable health information resource in the community. Major articles have appeared in the regions two largest newspapers, the *Cincinnati Enquirer* and the *Kentucky Enquirer*. One of the local television stations broadcast a feature story about NetWellness that included interviews with key project staff. The UCMC Public Relations Office has contributed to the publicity effort by issuing several press releases and publishing announcements in the Medical Center's weekly newsletter, *Corridor Weekly*. And in 1996, the Department of Commerce invited NetWellness developers to a national press conference in Washington, DC, to demonstrate selected TIIAP-funded projects. A listing of additional media stories and events is presented in Appendix C.

## Potential for the Project to Serve as a Model

NetWellness can serve as an excellent model for other web-based information services in health or any other field. NetWellness administrators freely offer the software that was developed for NetWellness through the public domain so that other projects may benefit from their efforts. This commitment to serve as a model is already showing signs of success.

- Project leaders in conjunction with the Medical Library Association developed a continuing education course titled Developing a Consumer Health Network. Thirty-four medical librarians attended the 1-day course on May 24, 1997, in Seattle, Washington. Since the course has ended, the NetWellness administrators who conducted the course have continued to exchange information with attendees from University of Arkansas and the Oregon Consumer Health Alliance who are attempting to replicate portions of the NetWellness model. In fact, project leaders were invited to the University of Arkansas in 1997 to conduct another continuing education course about NetWellness and consumer health for the medical group at the university.
- The State Library of Ohio has adopted many features of the NetWellness model as it begins to develop a statewide online community network called FamilyLink. The content of FamilyLink will be locally driven to provide a wide range of community resources, including NetWellness, to communities throughout the state.

## LESSONS LEARNED

By all indications, NetWellness represents a successful use of advanced telecommunications and information technologies to serve the public interest. Members of the NetWellness team reported several factors that contributed to the success of their project and that similar projects would be well advised to emulate.

The NetWellness organizers recognized early on that developing broad community involvement and solid political underpinnings would be critical to the success of the project. By nurturing long-standing



relationships with key state legislators, the NetWellness team was able to secure ongoing financial support from the State of Ohio to develop and continue the project beyond the close of the federal grant period. NetWellness also developed collaborative synergy with key health and information organizations such as Cincinnati Bell Telephone, OPLIN, OhioLINK, and the Ohio Department of Administrative Services to provide direct access to NetWellness resources in public access sites. Project staff worked hard to nurture positive relations with partners and vendors by identifying clear incentives for vendors to help solve problems and documenting all agreements in an open, friendly fashion. The NetWellness Steering Committee was also cited as an important mechanism for guiding the project in a number of important collaborations.

Another key to NetWellness' success was adherence to basic standards for the project's content and technical implementation wherever possible. An important issue in providing information from a variety of sources is the accuracy, completeness, and appropriateness of the material. To help ensure that the information provided meets these basic criteria, the NetWellness team developed a plan for reviewing system content. In this plan, teams of physicians, nurses, librarians with special health expertise, and other experts reviewed all resources made available on the system. Using a basic survey form, the experts would identify areas of weakness and when necessary resolve differences of opinion using standard protocols.

With respect to the technical side of the project, the NetWellness team committed themselves to relying on industry standards and market leaders for all hardware and software purchases rather than take chances with unproven technologies. Standard protocols, software and hardware enabled the project to adapt more nimbly to the evolution of the product marketplace. In the one instance in which the project team strayed from this general strategy and attempted to develop their own customized version of Mosaic, a great deal of time and effort was expended with virtually no benefit because the marketplace had caught up with the needs of the project by the time the extensive customization had been completed. Because this strategy of relying on industry standards is consistent with the University of Cincinnati's general approach to technology and infrastructure, the network is fully compatible with the university's telecommunications infrastructure. As an example, the project followed university policy and employed multiple servers in a building block fashion, rather than a mainframe-based configuration that would theoretically have been more powerful. Using multiple PCs as servers allowed the network to be more flexible and cost efficient as it grew and evolved. System failures were also reported to be easier to diagnose and correct because different network modules are located on different PCs.

Another important key to the success of the NetWellness project was finding an underwriter, the University of Cincinnati, to secure the matching commitment for the proposal, because acquiring local matching funds for a 50-50 matching grant can be a daunting endeavor. With this demonstration of commitment by the university, by the time the grant was awarded, several partners had approached the NetWellness administrators with firm commitments of support. Six months into the grant period, the university's match was entirely defrayed and the final matching budget was approximately double the federal award.

## **FUTURE PLANS**

NetWellness is a dynamic and fluid project that is continually evolving. According to one of the project leaders, the main future thrust of NetWellness will be "to continue to grow while maintaining the intimate feeling conveyed by the site." To determine NetWellness future, a planning team organized a strategic planning session in 1997 involving members of the local business community, health care community, the Medical Center, and Bio/Start, a state agency whose purpose it to assist in developing commercial applications of biotechnical research, attended. Many of the ideas that were generated at that meeting were

being prioritized by the NetWellness team at the time of the site visit in January 1998. Among the ideas being discussed were the following:

- Conducting formal outreach activities to encourage doctors to promote NetWellness during their consultations with patients.
- Developing a super-search engine which will enable the user to type in a term and find everything in NetWellness and its links that contains the term.
- Incorporating more graphics into the site, such as pictures of the people who serve as experts and animated illustrations of health-related processes.
- Making NetWellness more interactive by developing a point/counterpoint feature in which different perspectives on a current medical controversy or development will be presented and allowing users to react to the information via a formal survey.
- Restructuring the Ask an Expert feature to incorporate more multi-disciplinary, multi-institution teams to work together in responding to health inquiries from the public.
- Expanding into areas in which the public has expressed a great deal of interest such as alternative medicine and medical insurance.
- Involving medical and pharmacy students in answering public questions as part of their curriculum under the oversight of instructors and physicians.

However, the most significant development being planned involves marketing NetWellness as a commercial product to health care providers and employers. Although the network was developed with public monies and currently enjoys ongoing support from the state, network administrators feel it would be extremely short-sighted to tie the future of NetWellness to public monies, especially in an era of government cutbacks and with a legislature operating under term limits. NetWellness staff believe that their web site provides a valuable service by filtering out the questionable information available on the Internet and providing a high standard of quality assurance for its resources.